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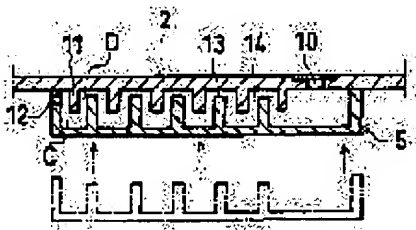
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**(54) INK TANK**



**(57)Abstract:**

**PROBLEM TO BE SOLVED:** To smoothly supply ink by effectively executing air ventilation by a constitution wherein an air ventilating hole and an air passage which communicates with the air ventilating hole are provided in a tank body or a cover of an ink tank and the air passage is formed in a labyrinth structure having a portion almost perpendicular to the bottom of the tank.

**SOLUTION:** An ink tank for an ink jet comprises a tank body 2 having a rectangular box shape opened to the lower portion and a bottom cover type cover body. An ink impregnated body constituted of a sponge is housed in the tank body 2 and an air member 5 having a rectangular box shape opened to the upper portion is provided at the tank body 2. The air member 5 has the shape that can cover an air hole 10 and a vertical rib 11, and a communicating hole 12 is provided at one end of the air member 5. Vertical ribs 13 each of which height is lower than the circumference section are integrally formed with the inner section of the air member 5. Each

of the vertical ribs 13 is provided between vertical ribs 11 at the side of the tank body 2 with gaps therebetween. As a result, a labyrinth structure capable of ventilating the air and preventing vaporization of the ink can be formed.



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**CLAIMS**

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[Claim(s)]

[Claim 1] The ink tank which prepares the air duct which is open for free passage to a tank body or a lid at a vent and a vent in the ink tank which contains ink, and an air duct comes to form with the labyrinth structure of having the part which makes a perpendicular mostly at the tank pars basilaris ossis occipitalis.

[Claim 2] The object for ink jets, ink tank which prepare the air duct which is open for free passage to a tank body or a lid at a vent and a vent in the ink tank which contains ink, and an air duct comes to form with the labyrinth structure of having the part which makes a perpendicular mostly at the tank pars basilaris ossis occipitalis.

[Claim 3] The ink tank according to claim 1 or 2 characterized by said air duct making size the cross section of the part near a tank pars basilaris ossis occipitalis from the cross section of other parts.

[Claim 4] The ink tank according to claim 1 to 3 characterized by for said air duct fixing the Ayr member at the tank-body upper part or the lid rear face, and forming labyrinth structure in it.

[Claim 5] Two or more ribs and vents which said air duct installed in the tank-body upper part or a lid rear face, It consists of a box-like Ayr member which has a free passage hole and set up two or more ribs on the base at the vent and reverse side. The ink tank according to claim 4 which fixes the rim section of the Ayr member at said tank-body upper part or the rear face of a lid, inserts alternately said vertical installation rib and said set-up rib with spacing, and is characterized by allotting a free passage hole and a vent to the both ends, and forming labyrinth structure in them.

[Claim 6] Said air duct fixes to the box-like crevice established in the tank-body upper part or a lid, and the periphery of a crevice, and consists a crevice of a wrap covering member. A crevice has a free passage hole and sets up two or more ribs on a base, and a covering member has a vent and installs two or more ribs in a rear face at a free passage hole and reverse side. The ink tank according to claim 1 to 3 which fixes and covers said covering member to said crevice, inserts alternately said set-up rib and said vertical installation rib with spacing, and is characterized by allotting a free passage hole and a vent to the both ends, and forming labyrinth structure in them.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to an ink tank usable to the ink tank for ink jets



which a liquid ink drop is made to fly on various kinds of recording apparatus which contained ink, especially the detail paper, etc., and is recorded on them, a writing implement, etc.

[0002]

[Description of the Prior Art] In order to have supplied ink at the ink jet head, the tip of writing, etc. smoothly through the ink feed hopper conventionally from the ink tank which contained ink, there was the need (air shift) of supplying the air of the decrement of the used ink. Therefore, there were some (for example, JP,4-144755,A, JP,5-17274,Y) which prepared the thin and long air duct in the tank upper part apart from the ink feed hopper, and carried out the air shift, and prevented ink evaporation.

[0003] However, although the air shift and the operation of ink antiflashing could be achieved by the ink tank of such structures when especially used for the intense object for the ink jets of vibration, the knock type note implement, etc., the ink which adhered to the air duct inlet port in an intense vibration of a repeat, change of an external environment ( an atmospheric pressure, temperature), etc. moved gradually, and from the air duct outlet, leak slightly, it rarely came out, and perfect ink leakage prevention be impossible. Since this ink leakage soiled a user's finger and clothes and served as big claims even if there is rarely, while sufficient air shift was completed, the ink tank which can prevent the ink leakage from an air hole completely was the strong request of the industry.

[0004]

[Problem(s) to be Solved by the Invention] This invention sets offer of the ink tank which is going to solve such a trouble, can also prevent evaporation of ink while fully being able to perform the air shift which can continue ink supply smoothly in the ink tank of ink receipt, and can prevent the ink leakage from an air duct completely as the purpose.

[0005]

[Means for Solving the Problem] This invention prepared the air duct which opens an ink tank for free passage to a tank body or a lid at a vent and a vent in the ink tank which contains ink in order to solve said technical problem, and the air duct considered it as the configuration which it comes to form with the labyrinth structure of having the part which makes a perpendicular mostly at the tank pars basilaris ossis occipitalis.

[0006] The ink tank of this invention is applicable also as [ both ] the object for writing implements etc. also as an object for ink jets. Moreover, if the cross section of the part near a tank pars basilaris ossis occipitalis is made into size from the cross section of other parts, since the ink hold force of the part will become large, it becomes effective [ ink leakage prevention ] more [ the air duct of this invention ].

[0007]

[Embodiment of the Invention] Two or more ribs and vents which were installed in the tank-body upper part or a lid rear face as the air duct of this invention been what fixed the Ayr member at the tank-body upper part or the lid rear face, and formed labyrinth structure in it, carried it out and especially shown in drawing 1 - drawing 3 , It consists of a box-like Ayr member which has a vent and the free passage hole located in the reverse side, and set up two or more ribs on the base. The rim section of the Ayr member is fixed at said tank-body upper part or the rear face of a lid, said vertical installation rib and said set-up rib are alternately inserted with spacing, a free passage hole and a vent are allotted to the both ends, and it can form in labyrinth structure.

[0008] Moreover, the box-like crevice established in the tank-body upper part or a lid as shows the air duct of this invention to drawing 4 , Fix to the periphery of a crevice and consist a crevice



of a wrap covering member, and a crevice has a free passage hole and sets up two or more ribs on a base. A covering member has a vent in a free passage hole and reverse side, installs two or more ribs in a rear face, fixes and covers said covering member to said crevice, inserts alternately said set-up rib and said vertical installation rib with spacing, allots a free passage hole and a vent to the both ends, and can form also in labyrinth structure.

[0009] Both the things of a wrap top-cover mold can use the tank body of upper part opening as shows the tank body of lower part opening as shows the ink tank of this invention to drawing 1 - drawing 3 as what is used for ink jets to the thing of a wrap base lid mold, and drawing 4 by the base lid by the top cover.

[0010] If the ink tank of this invention is equipped with and recorded on an ink jet printer, the open air carries out the air shift of the part for the reduction ink in an ink tank through a vent, an air duct, and a free passage hole, and can continue smooth ink supply. Moreover, even if ink adheres to a free passage hole and it enters in an air duct, ink stops at the first pars basilaris ossis occipitalis, since there is a degree even if it should be difficult to reach upwards and to overcome a vertical path and should overcome it, and there are two or more they, it does not reach to a vent and ink leakage can be prevented. In addition, if the clinch section of the lower part near a tank pars basilaris ossis occipitalis is made larger than the cross section of other parts for the cross section of an air duct, the ink hold capacity there becomes still larger, and ink leakage can be prevented more completely.

[0011] Moreover, the ink tank of this invention establishes the slot turned up up and down in the piece external surface of a side of a tank body as shown in drawing 5 - drawing 6 as what is used for ink jets, makes a free passage hole with the inside of a tank open the end section for free passage, locates the other end up, and covers and sticks parts other than the other end from the method of outside by the seal member. If it carries out like this, the other end of a slot serves as a vent wide opened in the open air, the amount of [ which was covered by the seal ] slot will become the air duct of the labyrinth structure turned up up and down, and it will make the same operation as the above-mentioned air duct.

[0012] In addition, a vertical installation rib may be directly prepared from a top-cover rear face, and a box-like crevice may be established in the tank-body upper part.

[0013] Furthermore, as the ink tank of this invention is shown in drawing 7 as what is used for writing implements, inside of the body, the ink induction slot from a tip to the ball and ball which are a writing tip one by one, the ink induction heart, an ink sinking-in object, and a lid are contained to the tank book inside of the body, the open air, a vent open for free passage, and the air duct of labyrinth structure are prepared in a lid, and an air shift, ink desiccation prevention, and ink leakage prevention are acted.

[0014]

[Example] Hereafter, a drawing explains the example of this invention. The example of drawing 1 - drawing 3 is for ink jets, and the ink tank 1 consists of the tank body 2 which makes the rectangular box-like one of lower part opening, the base lid-like lid 3, an ink sinking-in object 4 which consists of sponge, and an Ayr member 5 which makes the rectangular box-like one of upper part opening. The body 2 of ink inserts the ink sinking-in material 4 in the interior, fixes the periphery section of a lid 3 by heat joining in the opening periphery section, uses it as the letter tank of sealing, pours in ink, and makes ink hold to the ink sinking-in material 4.

[0015] A lid 3 forms a projected part 6 in the one flank, and has formed the ink feed zone 7 to a recording head (not shown) in the projected part 6. The tank body 2 has formed the rib 11 of short \*\* which adjoined the protruding piece 8 installed in the upper piece, the ink injected hole



9, the vent 10, and the vent 10, and was installed mostly at equal intervals six pieces, respectively.

[0016] The Ayr member 5 is made into the magnitude which can cover a vent 10 and the vertical installation rib 11. The inside depth is made larger than the height of the vertical installation rib 11, width of face between the piece inside of both sides is made into the magnitude which can insert the edges on both sides of a rib 11, the free passage hole 12 is formed in the piece of an end, and the low set-up rib 13 of height is mostly formed in the interior at equal intervals from the circumferential piece the piece of a bottom and the piece of both sides, and in the shape of [ five ] one. When the set-up rib 13 is inserted between the vertical installation ribs 11, between both the ribs 11 and 13, spacing of the set-up rib 13 is made into the magnitude which produces a gap, presupposes that spacing with the piece of an end which formed the free passage hole 12 is also almost the same, and leaves big dead air space to other end one side.

[0017] Opening of the Ayr member 5 is made to counter the vent 10 and the vertical installation rib 11 of a tank body 2 from a lower part, inserting so that the set-up rib 13 may come at equal intervals between the vertical installation ribs 11, the edges on both sides of the vertical installation rib 11 are inserted between the pieces of both sides of the Ayr member 5, and the periphery section of the Ayr member 5 is fixed by heat joining on the piece inferior surface of tongue of a tank-body 2 top.

[0018] In this way, it is formed as one air duct 14 which makes the labyrinth structure which from the free passage hole 12 to the vent 10 turns up perpendicularly (perpendicular to a tank pars basilaris ossis occipitalis), and the open air is open for free passage in the ink tank 1. In addition, the height of both the ribs 11 and 13, thickness, and spacing are decided so that it may become larger than the cross-sectional area of other parts (the D section of drawing 2 ) here about the cross-sectional area of the part (the C section of drawing 2 ) of the bottom of an air duct 14.

[0019] If a printer (not shown) is equipped with the ink tank 1 of this example, the ink within the ink sinking-in object 4 will be led to a recording head from the ink feed zone 7 with the pump (not shown) of a printer, and will record on the recording paper etc. If ink is consumed, the open air will be drawn in the ink tank 1 through a vent 10, an air duct 14, and the free passage hole 12, and the air shift of an ink decrement will be performed. Moreover, since an air duct 14 turns into a narrow path where distance is long with labyrinth structure, ink evaporation can be prevented. Furthermore, even if ink adheres to the free passage hole 12 in an intense vibration, change of an external environment (an atmospheric pressure, temperature), etc. and the part enters in an air duct 14 Ink stops at the first pars basilaris ossis occipitalis with the large cross section (I section), even if it should be difficult to reach upwards and to overcome a vertical path and should get over, it stops at the following pars basilaris ossis occipitalis, and it becomes still more difficult to reach upwards and to overcome the path of the following length. Since there are two or more they, it does not reach to a vent 10 and ink leakage can be prevented completely.

[0020] Drawing 4 shows the 2nd example applied as an object for ink jets, tank-body 2' forms the box-like crevice 21 bent caudad while forming a protruding piece 8 and the ink injected hole 9 in lid 3', and it is the top-cover mold of upper part opening, and it fixes the wrap covering member 22 for a crevice 21 by heat joining to the periphery of a crevice 21. And the air duct 14 which forms the free passage hole 12 and the set-up rib 13 in a crevice 21, forms the vertical installation rib 11 and a vent 10 in the covering member 22, respectively, combines as mentioned above, and makes vertical labyrinth structure is formed. Other configurations and operations are the same as that of the 1st example.



[0021] The 3rd example applied as an object for ink jets is shown, establish the slot 23 turned up and down in the piece external surface of a side of a tank body 2, free passage hole 12" with the inside of a tank is made to open the end section for free passage, and drawing 5 - drawing 6 are other end 10". You make it located up and it is other end 10". The part of an except is covered and stuck from the method of outside by the seal member 24. like this -- carrying out -- if -- a slot -- the other end -- the open air -- having opened wide -- a vent -- ten -- " -- becoming -- a seal -- a member -- 24 -- covering -- having had -- a slot -- a part -- up and down -- turning up - - a labyrinth -- structure -- an air duct -- 14 -- " -- becoming -- the above-mentioned -- ink -- a tank -- one -- being the same -- an operation -- making -- a thing -- it is .

[0022] The example shown in drawing 7 shows other examples which carried out the method of a writing implement and which applied, it contains the ink induction slot 33 from a tip to the ball 32 and the ball 32 which is a writing tip one by one, the ink induction heart 34, the ink sinking-in object 35, and a lid 36, forms the open air, a vent 37 open for free passage, and the air duct 38 of labyrinth structure in a lid 36 in a tank body 31, and acts an air shift, ink desiccation prevention, and ink leakage prevention.

[0023]

[Effect of the Invention] This invention can offer the ink tank which can also prevent ink evaporation and can prevent the ink leakage from an air duct completely by said configuration in the ink tank which contains ink while being able to perform sufficient air shift which can continue ink supply smoothly.

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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to an ink tank usable to the ink tank for ink jets which a liquid ink drop is made to fly on various kinds of recording apparatus which contained ink, especially the detail paper, etc., and is recorded on them, a writing implement, etc.

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## PRIOR ART

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[Description of the Prior Art] In order to have supplied ink at the ink jet head, the tip of writing, etc. smoothly through the ink feed hopper conventionally from the ink tank which contained ink, there was the need (air shift) of supplying the air of the decrement of the used ink. Therefore, there were some (for example, JP,4-144755,A, JP,5-17274,Y) which prepared the thin and long air duct in the tank upper part apart from the ink feed hopper, and carried out the air shift, and prevented ink evaporation.

[0003] However, although the air shift and the operation of ink antiflashing could be achieved by the ink tank of such structures when especially used for the intense object for the ink jets of vibration, the knock type note implement, etc., the ink which adhered to the air duct inlet port in an intense vibration of a repeat, change of an external environment ( an atmospheric pressure, temperature), etc. moved gradually, and from the air duct outlet, leak slightly, it rarely came out, and perfect ink leakage prevention be impossible. Since this ink leakage soiled a user's finger and clothes and served as big claims even if there is rarely, while sufficient air shift was



completed, the ink tank which can prevent the ink leakage from an air hole completely was the strong request of the industry.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] This invention can offer the ink tank which can also prevent ink evaporation and can prevent the ink leakage from an air duct completely by said configuration in the ink tank which contains ink while being able to perform sufficient air shift which can continue ink supply smoothly.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] This invention sets offer of the ink tank which is going to solve such a trouble, can also prevent evaporation of ink while fully being able to perform the air shift which can continue ink supply smoothly in the ink tank of ink receipt, and can prevent the ink leakage from an air duct completely as the purpose.

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## MEANS

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[Means for Solving the Problem] This invention prepared the air duct which opens an ink tank for free passage to a tank body or a lid at a vent and a vent in the ink tank which contains ink in order to solve said technical problem, and the air duct considered it as the configuration which it comes to form with the labyrinth structure of having the part which makes a perpendicular mostly at the tank pars basilaris ossis occipitalis.

[0006] The ink tank of this invention is applicable also as [ both ] the object for writing implements etc. also as an object for ink jets. Moreover, if the cross section of the part near a tank pars basilaris ossis occipitalis is made into size from the cross section of other parts, since the ink hold force of the part will become large, it becomes effective [ ink leakage prevention ] more [ the air duct of this invention ].

[0007]

[Embodiment of the Invention] Two or more ribs and vents which were installed in the tank-body upper part or a lid rear face as the air duct of this invention been what fixed the Ayr member at the tank-body upper part or the lid rear face, and formed labyrinth structure in it, carried it out and especially shown in drawing 1 - drawing 3 , It consists of a box-like Ayr member which has a vent and the free passage hole located in the reverse side, and set up two or more ribs on the base. The rim section of the Ayr member is fixed at said tank-body upper part or the rear face of a lid, said vertical installation rib and said set-up rib are alternately inserted with spacing, a free passage hole and a vent are allotted to the both ends, and it can form in labyrinth structure.

[0008] Moreover, the box-like crevice established in the tank-body upper part or a lid as shows the air duct of this invention to drawing 4 , Fix to the periphery of a crevice and consist a crevice of a wrap covering member, and a crevice has a free passage hole and sets up two or more ribs



on a base. A covering member has a vent in a free passage hole and reverse side, installs two or more ribs in a rear face, fixes and covers said covering member to said crevice, inserts alternately said set-up rib and said vertical installation rib with spacing, allots a free passage hole and a vent to the both ends, and can form also in labyrinth structure.

[0009] Both the things of a wrap top-cover mold can use the tank body of upper part opening as shows the tank body of lower part opening as shows the ink tank of this invention to drawing 1 - drawing 3 as what is used for ink jets to the thing of a wrap base lid mold, and drawing 4 by the base lid by the top cover.

[0010] If the ink tank of this invention is equipped with and recorded on an ink jet printer, the open air carries out the air shift of the part for the reduction ink in an ink tank through a vent, an air duct, and a free passage hole, and can continue smooth ink supply. Moreover, even if ink adheres to a free passage hole and it enters in an air duct, ink stops at the first pars basilaris ossis occipitalis, since there is a degree even if it should be difficult to reach upwards and to overcome a vertical path and should overcome it, and there are two or more they, it does not reach to a vent and ink leakage can be prevented. In addition, if the clinch section of the lower part near a tank pars basilaris ossis occipitalis is made larger than the cross section of other parts for the cross section of an air duct, the ink hold capacity there becomes still larger, and ink leakage can be prevented more completely.

[0011] Moreover, the ink tank of this invention establishes the slot turned up up and down in the piece external surface of a side of a tank body as shown in drawing 5 - drawing 6 as what is used for ink jets, makes a free passage hole with the inside of a tank open the end section for free passage, locates the other end up, and covers and sticks parts other than the other end from the method of outside by the seal member. If it carries out like this, the other end of a slot serves as a vent wide opened in the open air, the amount of [ which was covered by the seal ] slot will become the air duct of the labyrinth structure turned up up and down, and it will make the same operation as the above-mentioned air duct.

[0012] In addition, a vertical installation rib may be directly prepared from a top-cover rear face, and a box-like crevice may be established in the tank-body upper part.

[0013] Furthermore, as the ink tank of this invention is shown in drawing 7 as what is used for writing implements, inside of the body, the ink induction slot from a tip to the ball and ball which are a writing tip one by one, the ink induction heart, an ink sinking-in object, and a lid are contained to the tank book inside of the body, the open air, a vent open for free passage, and the air duct of labyrinth structure are prepared in a lid, and an air shift, ink desiccation prevention, and ink leakage prevention are acted.

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## EXAMPLE

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[Example] Hereafter, a drawing explains the example of this invention. The example of drawing 1 - drawing 3 is for ink jets, and the ink tank 1 consists of the tank body 2 which makes the rectangular box-like one of lower part opening, the base lid-like lid 3, an ink sinking-in object 4 which consists of sponge, and an Ayr member 5 which makes the rectangular box-like one of upper part opening. The body 2 of ink inserts the ink sinking-in material 4 in the interior, fixes the periphery section of a lid 3 by heat joining in the opening periphery section, uses it as the letter tank of sealing, pours in ink, and makes ink hold to the ink sinking-in material 4.

[0015] A lid 3 forms a projected part 6 in the one flank, and has formed the ink feed zone 7 to a



recording head (not shown) in the projected part 6. The tank body 2 has formed the rib 11 of short \*\* which adjoined the protruding piece 8 installed in the upper piece, the ink injected hole 9, the vent 10, and the vent 10, and was installed mostly at equal intervals six pieces, respectively.

[0016] The Ayr member 5 is made into the magnitude which can cover a vent 10 and the vertical installation rib 11. The inside depth is made larger than the height of the vertical installation rib 11, width of face between the piece inside of both sides is made into the magnitude which can insert the edges on both sides of a rib 11, the free passage hole 12 is formed in the piece of an end, and the low set-up rib 13 of height is mostly formed in the interior at equal intervals from the circumferential piece the piece of a bottom and the piece of both sides, and in the shape of [ five ] one. When the set-up rib 13 is inserted between the vertical installation ribs 11, between both the ribs 11 and 13, spacing of the set-up rib 13 is made into the magnitude which produces a gap, presupposes that spacing with the piece of an end which formed the free passage hole 12 is also almost the same, and leaves big dead air space to other end one side.

[0017] Opening of the Ayr member 5 is made to counter the vent 10 and the vertical installation rib 11 of a tank body 2 from a lower part, inserting so that the set-up rib 13 may come at equal intervals between the vertical installation ribs 11, the edges on both sides of the vertical installation rib 11 are inserted between the pieces of both sides of the Ayr member 5, and the periphery section of the Ayr member 5 is fixed by heat joining on the piece inferior surface of tongue of a tank-body 2 top.

[0018] In this way, it is formed as one air duct 14 which makes the labyrinth structure which from the free passage hole 12 to the vent 10 turns up perpendicularly (perpendicular to a tank pars basilaris ossis occipitalis), and the open air is open for free passage in the ink tank 1. In addition, the height of both the ribs 11 and 13, thickness, and spacing are decided so that it may become larger than the cross-sectional area of other parts (the D section of drawing 2 ) here about the cross-sectional area of the part (the C section of drawing 2 ) of the bottom of an air duct 14.

[0019] If a printer (not shown) is equipped with the ink tank 1 of this example, the ink within the ink sinking-in object 4 will be led to a recording head from the ink feed zone 7 with the pump (not shown) of a printer, and will record on the recording paper etc. If ink is consumed, the open air will be drawn in the ink tank 1 through a vent 10, an air duct 14, and the free passage hole 12, and the air shift of an ink decrement will be performed. Moreover, since an air duct 14 turns into a narrow path where distance is long with labyrinth structure, ink evaporation can be prevented. Furthermore, even if ink adheres to the free passage hole 12 in an intense vibration, change of an external environment (an atmospheric pressure, temperature), etc. and the part enters in an air duct 14 Ink stops at the first pars basilaris ossis occipitalis with the large cross section (I section), even if it should be difficult to reach upwards and to overcome a vertical path and should get over, it stops at the following pars basilaris ossis occipitalis, and it becomes still more difficult to reach upwards and to overcome the path of the following length. Since there are two or more they, it does not reach to a vent 10 and ink leakage can be prevented completely.

[0020] Drawing 4 shows the 2nd example applied as an object for ink jets, tank-body 2' forms the box-like crevice 21 bent caudad while forming a protruding piece 8 and the ink injected hole 9 in lid 3', and it is the top-cover mold of upper part opening, and it fixes the wrap covering member 22 for a crevice 21 by heat joining to the periphery of a crevice 21. And the air duct 14 which forms the free passage hole 12 and the set-up rib 13 in a crevice 21, forms the vertical installation rib 11 and a vent 10 in the covering member 22, respectively, combines as mentioned



above, and makes vertical labyrinth structure is formed. Other configurations and operations are the same as that of the 1st example.

[0021] The 3rd example applied as an object for ink jets is shown, establish the slot 23 turned up and down in the piece external surface of a side of a tank body 2, free passage hole 12" with the inside of a tank is made to open the end section for free passage, and drawing 5 - drawing 6 are other end 10". You make it located up and it is other end 10". The part of an except is covered and stuck from the method of outside by the seal member 24. like this -- carrying out -- if -- a slot -- the other end -- the open air -- having opened wide -- a vent -- ten -- " -- becoming -- a seal -- a member -- 24 -- covering -- having had -- a slot -- a part -- up and down -- turning up - - a labyrinth -- structure -- an air duct -- 14 -- " -- becoming -- the above-mentioned -- ink -- a tank -- one -- being the same -- an operation -- making -- a thing -- it is .

[0022] The example shown in drawing 7 shows other examples which carried out the method of a writing implement and which applied, it contains the ink induction slot 33 from a tip to the ball 32 and the ball 32 which is a writing tip one by one, the ink induction heart 34, the ink sinking-in object 35, and a lid 36, forms the open air, a vent 37 open for free passage, and the air duct 38 of labyrinth structure in a lid 36 in a tank body 31, and acts an air shift, ink desiccation prevention, and ink leakage prevention.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the outline of the example of this invention.

[Drawing 2] It is the A section enlarged drawing of drawing 1 .

[Drawing 3] It is the perspective view of the Ayr member of this example.

[Drawing 4] It is the sectional view showing the outline of other examples of this invention.

[Drawing 5] It is the side elevation of other examples of this invention.

[Drawing 6] It is the fragmentary sectional view of the B-B line of drawing 5 .

[Drawing 7] It is the sectional view showing the outline of other examples of this invention.

### [Description of Notations]

1 Ink Tank

2 Tank Body

3 Lid

4 Ink Sinking-in Object

5 Ayr Member

10 Vent

11 Vertical Installation Rib

12 Free Passage Hole

13 Set-up Rib

14 Air Duct

21 Box-like Crevice

22 Covering Member

32 Ball

35 Ink Sinking-in Object

36 Lid



Machine English translation of JP 11-105305

37 Vent

38 Air Duct



(51) Int.Cl.<sup>6</sup>

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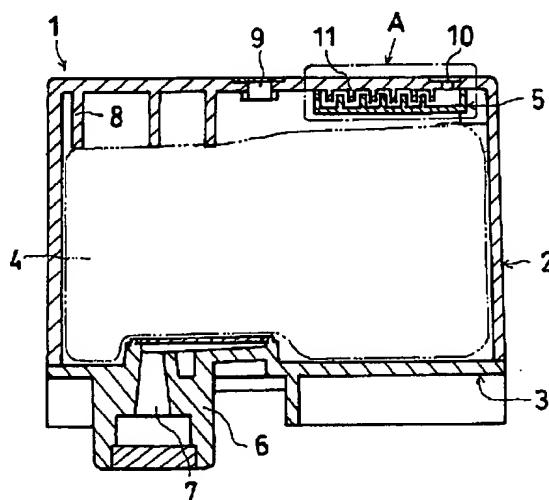
式会社パイロット平塚工場内

(54) 【発明の名称】 インクタンク

(57) 【要約】

【課題】 本発明は、インク収納のインクタンクにおいて、インク供給を円滑に続行できる空気交替が十分に行えとともに、インクの蒸発も防止でき、かつ空気通路からのインク漏れを完全に防ぐことができるインクタンクを目的とする。

【解決手段】 本発明はインクタンクを、インクを収納するインクタンクにおいて、タンク本体又は蓋体に空気孔と空気孔に連通する空気通路を設け、空気通路がタンク底部にほぼ垂直をなす部分を有するラビリンス構造で形成してなる構成とした。また、空気通路を、タンク底部に近い部分の断面積を他の部分の断面積より大にして、その部分のインク保留力を大きくすることによってインク漏れ防止をより効果的とした。





【特許請求の範囲】

【請求項1】 インクを収納するインクタンクにおいて、タンク本体又は蓋体に空気孔と空気孔に連通する空気通路を設け、空気通路がタンク底部にほぼ垂直をなす部分を有するラビリンス構造で形成してなる、インクタンク。

【請求項2】 インクを収納するインクタンクにおいて、タンク本体又は蓋体に空気孔と空気孔に連通する空気通路を設け、空気通路がタンク底部にほぼ垂直をなす部分を有するラビリンス構造で形成してなるインクジェット用、インクタンク。

【請求項3】 前記空気通路が、タンク底部に近い部分の断面積を他の部分の断面積より大としたことを特徴とする、請求項1又は2記載のインクタンク。

【請求項4】 前記空気通路が、タンク本体上部又は蓋体裏面にエア部材を固着してラビリンス構造を形成することを特徴とする、請求項1～3記載のインクタンク。

【請求項5】 前記空気通路が、タンク本体上部又は蓋体裏面に垂設した複数のリブおよび空気孔と、空気孔と逆側に連通孔を有し底面に複数のリブを立設した箱状のエア部材よりなり、エア部材の外縁部を前記タンク本体上部又は蓋体の裏面に固着し、前記垂設リブと前記立設リブを互い違いに間隔をもって挿入し、その両端部に連通孔と空気孔を配してラビリンス構造を形成することを特徴とする、請求項4記載のインクタンク。

【請求項6】 前記空気通路が、タンク本体上部又は蓋体に設けた箱状の凹部と、凹部の周辺部に固着して凹部を覆うカバー部材よりなり、凹部が連通孔を有し底面に複数のリブを立設し、カバー部材が連通孔と逆側に空気孔を有し裏面に複数のリブを垂設し、前記カバー部材を前記凹部に固着して覆い、前記立設リブと前記垂設リブを互い違いに間隔をもって挿入し、その両端部に連通孔と空気孔を配してラビリンス構造を形成することを特徴とする、請求項1～3記載のインクタンク。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、インクを収納した各種の記録装置、特に記録紙等にインク液滴を飛翔させて記録するインクジェット用のインクタンク、および筆記具等に使用可能なインクタンクに関する。

【0002】

【従来の技術】 従来、インクを収納したインクタンクよりインク供給口を通じてインクジェットヘッドや筆記先端等にインクを円滑に供給するには、使用したインクの減少分の空気を補給する（空気交替）必要があった。そのためインク供給口とは別にタンク上部に細くて長い空気通路を設けて空気交替をし、かつインク蒸発を防止したもの（例えば特開平4-144755、実公平5-17274）があった。

【0003】 しかし、これらの構造のインクタンクで

は、特に振動の激しいインクジェット用やノック式筆記具等に使用されると、空気交替やインク蒸発防止の作用は果たせるが、繰り返しの激しい振動や外部環境（気圧、温度）の変化等で空気通路入口に付着したインクが徐々に移動して空気通路出口から僅かに漏れ出ることがまれにあり、完全なインク漏れ防止は不可能だった。このインク漏れはまれにあったとしてもユーザーの手指や衣服を汚し大きなクレームとなるため、十分な空気交替ができると同時に通気孔からのインク漏れを完全に防止できるインクタンクは業界の強い要望であった。

【0004】

【発明が解決しようとする課題】 本発明はこのような問題を解決しようとするもので、すなわち、インク収納のインクタンクにおいて、インク供給を円滑に続行できる空気交替が十分に行えとともに、インクの蒸発も防止でき、かつ空気通路からのインク漏れを完全に防ぐことができるインクタンクの提供をその目的とする。

【0005】

【課題を解決するための手段】 本発明は前記課題を解決するためインクタンクを、インクを収納するインクタンクにおいて、タンク本体又は蓋体に空気孔と空気孔に連通する空気通路を設け、空気通路がタンク底部にほぼ垂直をなす部分を有するラビリンス構造で形成してなる構成とした。

【0006】 本発明のインクタンクは、インクジェット用としても筆記具用等としても共に適用できる。また、本発明の空気通路は、タンク底部に近い部分の断面積を他の部分の断面積より大にすると、その部分のインク保留力が大きくなるのでインク漏れ防止がより効果的となる。

【0007】

【実施の態様】 本発明の空気通路は、タンク本体上部又は蓋体裏面にエア部材を固着してラビリンス構造を形成したもので実施でき、特に、図1～図3に示すようなタンク本体上部又は蓋体裏面に垂設した複数のリブおよび空気孔と、空気孔と逆側に位置した連通孔を有し底面に複数のリブを立設した箱状のエア部材よりなり、エア部材の外縁部を前記タンク本体上部又は蓋体の裏面に固着し、前記垂設リブと前記立設リブを互い違いに間隔をもって挿入し、その両端部に連通孔と空気孔を配してラビリンス構造に形成できる。

【0008】 また、本発明の空気通路は、図4に示すようなタンク本体上部又は蓋体に設けた箱状の凹部と、凹部の周辺部に固着して凹部を覆うカバー部材よりなり、凹部が連通孔を有し底面に複数のリブを立設し、カバー部材が連通孔と逆側に空気孔を有し裏面に複数のリブを垂設し、前記カバー部材を前記凹部に固着して覆い、前記立設リブと前記垂設リブを互い違いに間隔をもって挿入し、その両端部に連通孔と空気孔を配してラビリンス構造にも形成できる。



【0009】本発明のインクタンクは、インクジェット用に使用するものとして図1～図3に示すような下方開口のタンク本体を底蓋で覆う底蓋型のもの、図4に示すような上方開口のタンク本体を上蓋で覆う上蓋型のものが共に使用できる。

【0010】本発明のインクタンクをインクジェットプリンタに装着し記録すると、外気は空気孔、空気通路、連通孔を通してインクタンク内の減少インク分を空気交替し、円滑なインク供給が続行できる。また、インクが連通孔に付着して空気通路内に入っても、インクは最初の底部に留まって縦の通路を上に登って乗り越えることは困難であり、万が一それを乗り越えたとしても次があり、それが複数個あるため空気孔まで達する事はなく、インク漏れを防止できる。なお、空気通路の断面積をタンク底部に近い下方の折り返し部を他部分の断面積より大きくすると、そこのインク保留能力がさらに大きくなり、インク漏れをより完全に防止できる。

【0011】また、本発明のインクタンクは、インクジェット用に使用するものとして図5～図6に示すようなタンク本体の側片外面に上下に折り返す溝を設け、その一端部をタンク内との連通孔に連通させ、その他端部を上方に位置させ、その他端部以外の箇所をシール部材で外方から覆って貼着したものである。こうすると、溝の他端部が外気に開放した空気孔となり、シールで覆われた溝部分は上下に折り返すラビリンス構造の空気通路となり前述の空気通路と同様の作用をなす。

【0012】なお、垂設リブは上蓋裏面から直接設けてもよく、箱状凹部はタンク本体上部に設けてもよい。

【0013】さらに、本発明のインクタンクを筆記具用に使用するものとしては、図7に示すようにタンク本体内に、先端から順次、筆記先端であるボール、ボールへのインク誘導溝、インク誘導芯、インク含浸体、および蓋体を収納し、蓋体に外気と連通する空気孔とラビリンス構造の空気通路を設けて、空気交替、インク乾燥防止、インク漏れ防止の作用をなすものである。

【0014】

【実施例】以下、本発明の実施例を図面により説明する。図1～図3の実施例はインクジェット用のものであって、インクタンク1は下方開口の方形箱状をなすタンク本体2、底蓋状の蓋体3、スポンジよりなるインク含浸体4、および上方開口の方形箱状をなすエア一部材5からなる。インク本体2はその内部にインク含浸材4を挿入し、その開口周縁部に蓋体3の周縁部を熱溶着で固着して密閉状タンクとし、インクを注入してインク含浸材4にインクを保持させる。

【0015】蓋体3は、その一側部に突部6を設け、突部6には記録ヘッド（図示せず）へのインク供給部7を設けてある。タンク本体2は、その上片に垂設した突片8、インク注入孔9、空気孔10、および空気孔10に隣接して6個ほぼ等間隔に垂設した短寸のリブ11をそれぞれ

設けてある。

【0016】エア一部材5は、空気孔10および垂設リブ11をカバーできる大きさとし、その内面深さを垂設リブ11の高さより大きくし、その両側片内面間の幅をリブ11の両側縁が嵌入可能な大きさとし、その一端片に連通孔12を設け、その内部に周片より高さの低い立設リブ13を底片および両側片と一体状に5個ほぼ等間隔に設けてある。立設リブ13の間隔は、垂設リブ11間に立設リブ13を挿入したとき、両リブ11、13間に間隙を生じる大きさとし、連通孔12を設けた一端片との間隔もほぼ同じとし、他端片側には大きな空所を残す。

【0017】タンク本体2の空気孔10および垂設リブ11に、エア一部材5の開口を下方から対向させ、立設リブ13が垂設リブ11間に等間隔になるよう挿入しつつ、エア一部材5の両側片間に垂設リブ11の両側縁を嵌入して、エア一部材5の周縁部をタンク本体2の上片下面に熱溶着で固着する。

【0018】こうして、連通孔12から空気孔10までが縦（タンク底部に対して垂直）に折り返すラビリンス構造をなす1本の空気通路14として形成され、外気がインクタンク1内と連通する。なお、ここで空気通路14の底の部分（図2のC部）の断面積を他の部分（図2のD部）の断面積より大きくするよう、両リブ11、13の高さ、厚さ、間隔を決めておく。

【0019】本実施例のインクタンク1をプリンタ（図示せず）に装着すると、インク含浸体4内のインクはプリンタのポンプ（図示せず）によりインク供給部7から記録ヘッドへ導かれ記録紙等に記録を行う。インクが消費されると、外気が空気孔10、空気通路14、連通孔12を通してインクタンク1内に導かれ、インク減少分の空気交替を行う。また、空気通路14がラビリンス構造で狭く距離の長い通路になるため、インク蒸発を防ぐことができる。さらに、激しい振動や外部環境（気圧、温度）の変化等でインクが連通孔12に付着し、その一部が空気通路14内に入ったとしても、インクは断面積の大きい最初の底部（イ部）に留まって縦通路を上に登って乗り越えることは困難であり、万が一乗り越えたとしても次の底部に留まり次の縦の通路を上に登って乗り越えることはさらに困難となる。それが複数個あるため空気孔10まで達する事はなく、インク漏れを完全に防止できる。

【0020】図4はインクジェット用として適用した第2の実施例を示すものであって、タンク本体2'は上方開口の上蓋型で、蓋体3'に突片8とインク注入孔9を設けるとともに下方に折り曲げた箱状の凹部21を設け、凹部21の周辺部に凹部21を覆うカバー部材22を熱溶着で固着する。そして、凹部21に連通孔12と立設リブ13を、カバー部材22に垂設リブ11と空気孔10をそれぞれ設けて前述のように組み合わせ縦のラビリンス構造をなす空気通路14を形成したものである。他の構成および作用は第1の実施例と同一である。



【0021】図5～図6はインクジェット用として適用した第3の実施例を示すもので、タンク本体2の側片外面に上下に折り返す溝23を設け、その一端部をタンク内との連通孔12”に連通させ、その他端部10”を上方に位置させ、その他端部10”以外の箇所をシール部材24で外方から覆って貼着したものである。こうすると、溝の他端部が外気に開放した空気孔10”となり、シール部材24で覆われた溝部分は上下に折り返すラビリンス構造の空気通路14”となっており、前述のインクタンク1と同様の作用をなすものである。

【0022】図7に示す実施例は筆記具ように適用した他の実施例を示すものであって、タンク本体31内に、先端から順次、筆記先端であるボール32、ボール32へのインク誘導溝33、インク誘導芯34、インク含浸体35、および蓋体36を収納し、蓋体36に外気と連通する空気孔37とラビリンス構造の空気通路38を設けて空気交替、インク乾燥防止、インク漏れ防止の作用をなすものである。

【0023】

【発明の効果】本発明は前記構成により、インクを収納するインクタンクにおいて、インク供給を円滑に続行できる十分な空気交替が行えとともに、インク蒸発も防止でき、かつ空気通路からのインク漏れを完全に防ぐことができるインクタンクが提供できる。

【図面の簡単な説明】

【図1】本発明の実施例の概要を示す断面図である。

【図2】図1のA部拡大図である。

【図3】同実施例のエア－部材の斜視図である。

【図4】本発明の他の実施例の概要を示す断面図である。

【図5】本発明の他の実施例の側面図である。

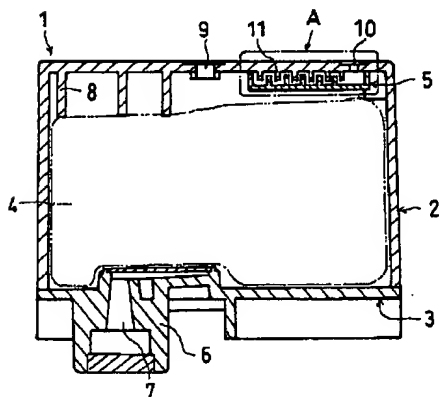
【図6】図5のB－B線の部分断面図である。

【図7】本発明の他の実施例の概要を示す断面図である。

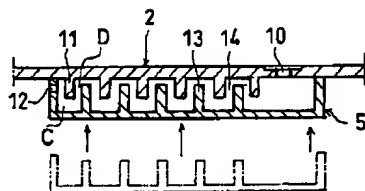
【符号の説明】

- 1 インクタンク
- 2 タンク本体
- 3 蓋体
- 4 インク含浸体
- 5 エア－部材
- 10 空気孔
- 11 垂設リブ
- 12 連通孔
- 13 立設リブ
- 14 空気通路
- 21 箱状凹部
- 22 カバー部材
- 32 ボール
- 35 インク含浸体
- 36 蓋体
- 37 空気孔
- 38 空気通路

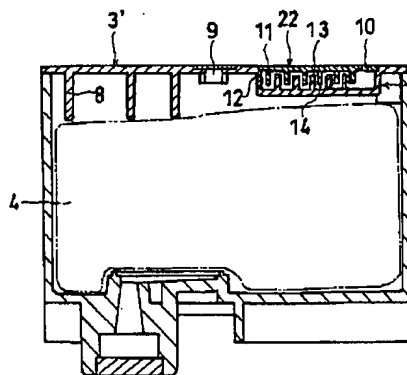
【図1】



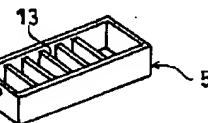
【図2】



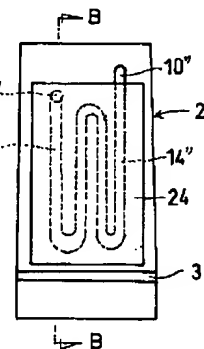
【図4】



【図5】

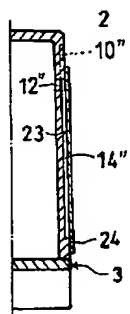


【図5】





【図6】



【図7】

